

Expect faster cell phones, better weather forecasts and cashier-less stores in 2020

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Better weather forecasts. Faster cellular service. Quicker wildfire detection. Easier ways to buy MTS passes. And speedy, cashier-free convenience stores.

They're all coming in 2020, brought along by advances in science and technology, including many innovations that were made or shaped in San Diego, a mecca for research.

The focal point is UC San Diego, which recently began using self-driving carts to deliver mail. It's also improving weather forecasting. And early next year, the school will open a [retail store](#) that doesn't need or use cashiers.

Nearby, the Salk Institute is making progress exploring the brain with a new technology called sonogenetics.

Here's a closer look at some of the innovations you can expect to see across the county in 2020.

Better weather forecasts

Weather is so complex forecasters often have only a general idea of how much rain will fall in San Diego hours before a storm arrives.

But scientists at UC San Diego are rapidly improving their ability to spot and track atmospheric rivers, huge plumes of moisture that arise in the tropics, sub-tropics and mid-latitudes.

The plumes periodically flow into Southern California and unleash torrential rain, sometimes with tragic results. More than 20 people were killed in Santa Barbara County in 2018 by mudslides triggered by an "AR," as they're known.

"We've developed a better sense of how storms develop and interact with the ocean," said Marty Ralph, director of the Center for Western Weather and Water Extremes at UCSD's Scripps Institution

of Oceanography.

That's leading to sharper forecasts. Ralph's team also has begun categorizing atmospheric rivers on a scale of one to five, with five being the strongest. It's meant to give the public a sense of how a storm will affect their lives.

The term is starting to be used on-air by TV forecasters, and it could become as well-known as the scale used to categorize hurricanes.

Faster wildfire detection

October was a nervous time in California. The combination of drought and stiff Santa Ana winds sent the threat of wildfires soaring. Places like Sonoma County saw that risk turn into a hellish reality.

On Oct. 23, a wildfire erupted in the tiny town of Geyserville. By the time it was fully contained, the blaze had charred nearly 80,000 acres, forced people to evacuate their homes, and destroyed or damaged more than 100 buildings.

It could have been worse.

Shortly after the fire started, the blaze was captured live and in color by ALERTWildfire an emerging statewide network of cameras developed by UC San Diego and its partners.

The images not only enabled firefighters to precisely locate the fire, but understand its behavior and movements—insights made possible by the increasing sophistication of the network.

The system allows firefighters to take control of cameras with computers and cellphones, helping them strategize about how to battle a blaze.

ALERTWildfire only had 25 cameras in 2018. More than 300 were added statewide this year. The

system will have 1,000 by 2021.

"This is a real-time, 3-D tool that's really making a difference," said Neal Driscoll, the UC San Diego geoscientist who has been the driving force behind the network.

Speedy cashier-less convenience stores

UC San Diego doesn't lack for students; it has nearly 40,000. But it has comparatively few retail stores, which is a problem on a campus that houses about 15,000 people.

A small-scale Target is expected to open next year, meeting some needs. The school also will get a tiny convenience store in March that's being jointly created by the university and Accel Robotics, a San Diego startup.

The techno kicker? The 400 square-foot store won't have cashiers.

"Students will swipe a credit or [debit card](#) as they enter the store," Accel and UCSD said in a statement. "They then will be able to just walk through and grab the items they need without having to check out.

"They will receive a receipt via text on their smartphone a few minutes after leaving the store. Initially, a host will be present to help students navigate the store and answer questions."

It's not a unique idea. Amazon is already running the same kind of stores. They're called Amazon Go.

But Accel and UCSD say this will be the first cashier-free convenience store to open on a US college campus.

Look for it next to the Jacobs School of Engineering.

An upcoming fix to MTS' antiquated fare collection system

San Diego prides itself on being a "smart city," a term that refers to exploiting technology to make communities safer, more livable and better

governed and managed.

The sloganeering isn't entirely true when it comes to one of the city's most crucial services, public transportation.

Compass Card, the electronic ticketing system used by the Metropolitan Transit System (MTS), is outdated and works poorly. It can take MTS up to 72 hours to load accurate and up-to-date information on the card.

"This is (a) bad customer experience in a day and age when people expect instant updates," MTS said in a statement.

"The Compass Card system was purchased in 2005 and the hardware is now at the end of its useful life."

That's going to change.

The agency, which serves about 300,000 riders a day, will begin to introduce a next generation fare collection system in late 2020 that is being developed by INIT, which did the same for Tri-Met in Portland.

But MTS riders are going to have to be patient; they won't be able to begin using the new system until spring 2021.

The 5G revolution is finally here

But will it live up to the feverish advertising?

We're about to find out. T-Mobile and AT&T are rolling out 5G wireless service in parts of San Diego County in a technology shift that's occurring nationally.

Consumers are being promised that mobile devices—notably phones—will work much faster, provide far better coverage, and be super responsive when asked to do something like download a movie.

But that's only part of the story. This fifth-generation technology also is meant to boost everything from self-driving cars to industrial robots to virtual reality-

headsets and telemedicine.

Service providers and technologists say that 5G could eventually deliver speeds 20 times faster than current networks.

Consumers have reason to be skeptical. Cellular companies experienced a lot of technical problems this year while testing their networks. The problems ranged from spotty coverage to transmission speeds that were not impressive. It'll take time to work out the kinks.

Early on, access also is going to be problem. As Union-Tribune technology reporter Mike Freeman notes, "You won't be able to access 5G networks unless you buy a new 5G phone, with a handful of devices for sale now and many more expected next year."

A new war hawk for the Marines

A new "bird" is about to begin flying in San Diego.

The fabled Marine Corps Air Station Miramar will soon get its first squadron of F-35C jets, a fifth-generation fighter that will replace some of the F/A-18s seen locally. The squadron will call Miramar home. But like other "Charlies," the jets will deploy on carriers.

Different versions of the F-35 have been developed for the Air Force, Navy and Marines in a program that's expected to cost taxpayers more than a trillion dollars over time.

The program has experienced many technical programs, notably with its ejection seats and helmet-displays. But the Pentagon says that F-35 will provide superior air and ground attack. Pilots rave about the plane's fly-ability. And the jets don't cause an unreasonable amount of racket.

"We've done multiple noise studies, and they're comparable to an F-18," Miramar-based Marine Maj. Timothy Farag told the Union-Tribune earlier this year.

"Jet noise is jet noise. I don't think there's much of a difference, having been around both aircraft."

A new way to explore the human brain

Medications can help control the symptoms of Parkinson's disease, but they can't cure the movement disorder.

Researchers don't have all the tools they need to explore the brain. Until they do, progress is likely to be slow and incremental.

But there's some promising news out of La Jolla.

The Salk Institute is making gains with sonogenetics, a new technology that involves using sound to control the activity in brain cells. It's an alternative to opto-genetics, an older approach that involves invasive surgery.

It's "early days" for sonogenetics, which was developed less than a decade ago by Salk researchers. But in 2020, it may continue to emerge as an indispensable tool in neurobiology.

The effort is being co-led by Sreekanth Chalasani, who told a medical publication, "Sonogenetics could enable doctors to turn on or turn off brain cells at a specific location or time and treat (Parkinson's, epilepsy, dyskinesia) without brain surgery."

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